

CLAIMS

1. A fluid delivery device, comprising:
an inner cylindrical tube having a top opening and a bottom opening; and
an upper cap overlying a top portion of the inner cylindrical tube, the upper cap moveably disposed over the inner cylindrical tube, the upper cap having a top with a plurality of holes defined therein, the top having a sidewall extending therefrom.
2. The device of claim 1, wherein the top of the upper cap is substantially flat.
3. The device of claim 1, wherein an interior surface of the upper cap includes a protrusion and an exterior surface of the inner cylindrical tube includes a protrusion.
4. The device of claim 1, wherein a gap between an inner surface of the upper cap and an outer surface of the inner cylindrical tube is sealed.
5. The device of claim 4, wherein the gap is sealed by one of an o-ring and a bellows seal.
6. The device of claim 1, wherein each of the plurality of holes has a diameter between about 0.5 millimeters (mm) and 5 mm.

7. The device of claim 1, wherein the upper cap and the inner cylindrical tube are one continuous unit having a common thinned section allowing a top portion of the nozzle to travel along an axis.

8. The device of claim 7, wherein the common thinned section has a thickness between about 0.01mm and 0.5mm.

9. The device of claim 1, wherein a fluid delivered to the bottom opening of the inner cylindrical tube at a flow rate of less than 100 ml per minute causes the upper cap to move vertically along an axis shared by the inner cylindrical tube and the upper cap.